# Chapter 25
# Community Forestry and Management of Forest Resources in Bhutan

**Ramashray Prasad**

**Abstract** Community forestry is that part of forest management in which local rural people are involved in strengthening, spreading, managing, utilizing, and increasing the productivity of the forest under their custody, as well as protecting and preserving the reserved government forests by reducing human pressure. The concept of community forestry came because of the drastic reduction in forest cover near or in the vicinity of human reach and the deteriorating productivity of the forest. It is not only the loss of forest but also of other organisms found in the region; many of the species of forest flora and fauna are on the verge of extinction. The rainfall and climate are changing rapidly, and there is a large extent of deteriorating forest cover. The forests also play a greater role in reducing greenhouse gases such as carbon dioxide by consumption through photosynthesis, apart from releasing oxygen. The vegetative cover is pumping out more and more moisture into the atmosphere to regulate the overall climate at a local level to the global scale. The forest is indispensable as it has multifaceted importance and cannot be further exploited without giving any second thought. When forests are to be utilized, such use must be done very judiciously and cautiously so that every proper care is taken. In another words, the forests should be managed sustainably. Almost all of Bhutan is mountainous by physical character with the very weak, fragile, susceptible, and shattered newly formed high Himalaya. The people are very much attached to the forests for their livelihood, and here it becomes even more important to manage the forest. Community forestry offers great hope and is growing very rapidly. Therefore, an attempt has been made to study community forestry in Bhutan in general, with particular emphasis on Eastern Bhutan.

**Keywords** Carbon sink • Community forestry • Forest products • Rural poverty • Sustainable forest management

R. Prasad (✉)
Bhim Rao Ambedkar College, University of Delhi, Yamuna Vihar, Main Wazirabad Road, Delhi 110094, India
e-mail: drrprasad2007@gmail.com



A.K. Dutt et al. (eds.), *Spatial Diversity and Dynamics in Resources and Urban Development*, DOI 10.1007/978-94-017-9771-9_25

## 25.1 Background

From the very advent of human evolution, human beings were closely related with nature. In fact, nature guided every activity of human beings. They lived with what was available in nature. The environment was in quite its original state. It was untouched, unharmed, and undamaged, and somehow, people were surviving. Those days, a simple roof or cave, the shade of a tree or hut over their heads, food from forest products or animal meat to fill their bellies, and some other requirements such as the skins of animals or large-sized leaves of trees to protect them from the harsh physical conditions of nature were used. For everything, humanity was dependent on nature. The gift of nature available on the Earth was lying there in almost pristine condition. With the introduction of agricultural activities, human beings started interacting with nature more forcefully. With the advancing scope of the human mind, they developed various types of tools and implements. These tools and implements helped make their life easier by developing and renovating their basic needs. Those basic needs kept on changing, particularly in terms of quality and comfort.

Now, the needs of modern-day people, especially in urban areas, demand more from nature. Rural areas are also transformed but to lesser degree. The ever-growing human population is the biggest culprit in pressuring nature as it demands more and more. Thus, natural resources are in great danger, and managing these is not easy. Forest resources, these days, are really very hard pressed in comparison to other resources.

The past century has witnessed a tremendous growth in world population. The growing population needs various resources from nature. Nature/Earth is limited and so are available resources. Many resources and species are threatened with extinction because of overutilization, because the level of consumption is greater than the replacement level. To feed the increasing population, people have used almost all the available land for cultivation on the plains as well as on hilly slopes. The mounting demand for food items from agriculture has led to cultivation of critical areas also. Such results are again detrimental for the survival of other resources at the place of criticality as well as downstream. It is time to think positively about proper planning and utilization of resources before expanding our uses. Increasing demand by people has resulted in overexploitation of forest resources. To overcome this problem, community forestry is one approach to manage the forest and forest resources.

## 25.2 Understanding Community Forestry

The term community is used for a group of people living in a particular area and sharing certain basic interests. For successful functioning of the community or society, the people must develop diverse institutions and organizations (Barua 2009). Generally, community forestry is seen as a way of sustainable forest management. Through community forestry, local people are involved in supervising the part of the forest allotted to them. They are concerned with the forest in terms of planting trees, looking after their growth, allowing them to mature, and using them when needs

arise for their own purpose. If the forest provides in excess of their requirements, they sell its products in the open market to fetch money to meet their other needs. Community forestry is local-level forest activity in which collective action is taken to plan, launch, monitor, evaluate, administer, obtain, and harvest various types of trees, bushes, herbs, fruits, plants, and vegetables, on communal lands. Various products from these forests are consumed by the community.

Rural poor people rely very greatly on the forest for various needs such as many types of wild vegetables, edible plants and roots, and a variety of fruits. The Secretary of the Ministry of Agriculture and Forest, Bhutan, Sherub Gyaltshen (Department of Forest and Park Services 2010) concludes that community forestry is a program that contributes to achieving many development goals: empowerment of communities, sustainable forest management, good governance, and poverty alleviation. Through community forestry, there is a reversal of the forest management paradigm from nationalization and centralization to devolution and decentralization in forest resource management.

Forestry is often defined as the manipulation of forests to achieve a desired objective, and it is the objective that distinguishes different types of forestry. In this context, managing forests with the express intent of benefiting neighboring communities constitutes community forestry (Brendler and Carey 1998). Forested or degraded forestland owned by the government, but formally handed over to a group of villagers for its protection, management, and utilization, is known as community forestry. All members of a community that regularly use a forest to meet their household needs organize themselves as a group, termed a Community Forest Management Group (CFMG), to protect, manage, and utilize the forest. Many rural communities depend on nearby forests as a source of economic well-being. Three attributes are commonly found with community forestry efforts.

### *25.2.1 Access of Forest Land and Its Resources by the Community*

Community forestry is closely associated with the benefits from forest resources, both timber and non-timber products. Poor local people receive a wage for collecting various items for their livelihood. These forest products are sold for money or may go to a factory as raw material. They also collect some edibles for their own consumption.

## 25.3 Decision-Making Authority with Community

A Community Forestry Management Group (CFMG) has the authority to make decisions for the betterment of the forest and its resource management, which includes the harvesting of forest products and selling in the open market whatever is in excess to the needs of the community, as well as regeneration of the forest.

### *25.3.1 Protection and Restoration of Community Forest*

The CFMG takes the responsibility of protecting and restoring the community forest as and when required. A balance between the use of land and the effects of such use is also controlled by a CFMG.

By promoting community forestry, indigenous knowledge of protecting and promoting forestry becomes very pertinent. Before this, forest resource management was in the hands of an educated generation who came through the bureaucratic system and used to tell the local people how to manage their forests. With community forestry, even the local knowledge that is passed from generation to generation verbally is now acknowledged. Rural people are not only getting the information from forest officials but also imparting their familiarity with nature to the officials. Now, it is not only a one-way traffic but works both ways.

## 25.4 Needs and Goals of Community Forestry in Bhutan

The community forestry in Bhutan is in great need with many goals starting from simply meeting the need of local people to the sustainable management of forests at the national level through this endeavor. The development goal for community forestry in Bhutan has been formulated as rural communities empowered to manage their own community forests sustainably to meet the majority of their timber demands and other forest goods and services, to derive economic benefits from the sale of forest products and services, and contribute to a reduction in rural poverty. Many key principles have been identified to guide the formulation of strategies for future focus and development of community forestry in Bhutan (Department of Forest and Park Services 2010): (1) ensure 60 % of the country's geographic area is under forest for all times to come; (2) balance conservation with sustainable utilization and management of biodiversity and forest and water resources; (3) support decentralization and devolution by empowering communities to manage their local forests; (4) improve governance of community forests, leading to improved forest conditions and the equitable distribution of benefits; (5) generate income for local communities through commercial harvesting of timber and non-wood forest products; (6) contribute to poverty reduction; and (7) provide, insofar as possible, timber for rural construction and maintenance.

The main goals are the establishment of a decentralized qualified forestry extension service, protection of aquifers and biodiversity, and income generation through the sale of excess forestry products from the community forests (Temphel and Beukeboom 2007). All these goals are based on the basic sustainability principle that the communities have the management rights and the responsibilities of the surrounding forest. In this way, the community feels the ownership and meets the challenge to manage it properly. Different communities in the nearby villages feel very competitive to manage the resources better than other villages. This competi-

tiveness makes them successful. Thus, they develop local pride, and this ultimately leads to better produce from the forest, both timber and non-wood forest products. Finally, the result reflects on the members of the community and enhances their livelihood and the betterment of their life, which helps in achieving the goal set for the 10th Five-Year Plan in reducing poverty.

### *25.4.1 A Brief Geoecological View of Bhutan*

Bhutan is a landlocked country, small in size and further smaller in terms of population. It lies in the Eastern Himalaya between Tibet to the north and India elsewhere. It encompasses an area of 38,394 km$^2$ and a population of only 672,425 (Census of Bhutan 2005), with an average density of 17.5 persons per square kilometer (km$^2$). It has a rugged and dissected mountainous topography of which the larger part is uninhabitable because of steep slopes and harsh climatic conditions. Nevertheless, the Himalayan Kingdom of Bhutan is endowed with rich natural resources such as forest, water, wildlife, and various species of flora and fauna. The vegetation varies from broad-leaved, wet subtropical occurrences in the south to alpine forest, bushes, and shrubs in the north.

Of the total area of the country, 72.5 % is covered with forests (PPD 2008). From Table 25.1, it is obvious that only 15 % of the area is below 1,200 m elevation. Even this area is hilly and not very much suited to agriculture. The remaining 85 % area is mountainous and susceptible to erosion and landslides. Any human activity in this zone is very disadvantageous in terms of environment and sustainable management. Table 25.1 shows only 89 % of Bhutan's area but the remaining area is above the altitude of 4,600 m and is devoid of vegetation cover, lying barren, because of low temperatures and high-altitude glaciers.

A large part of the forested areas in Bhutan is protected by National Parks (41 % of the forest cover) and biological corridors (8.6 % of the forest cover). About 14 % of the total forest is devoted to timber production and other commercial uses, which is the amount economically accessible with present-day available technology. Roughly 35.4 % of the forested area is still not usable for harvesting at present. Currently only about 1 % of the forest cover is under community forestry, whereas the target is to bring 4 % of the forest area under community forestry by the end of the country's 10th Five-Year Plan (2008–2013) of the country.

About 69 % of the population of the country lives in rural Bhutan. As per the Bhutan Living Standard Survey (National Statistics Bureau 2003), about 31 % of the population exists below the national poverty line. Of these, 94 % are in rural areas, and they are heavily dependent on forest resources. The major priority of the 10th Five-Year Plan of Bhutan is to reduce and overcome poverty, particularly in rural areas. To make the forest sustainable and reduce rural poverty, the community forestry program was adopted in the country.

**Table 25.1** Agro-ecological zones of Bhutan

| Agro-ecological zone | Altitude (meters, m)[£] | Inter-altitude area in percent[¥] | Annual rainfall (in cm)[£] | Annual mean temperature (°C)[£] |
|---|---|---|---|---|
| Alpine | 3,600–4,600 | 20.8 | Less than 65 | 5.5 |
| Cool temperate | 2,600–3,600 | 27.4 | 65–85 | 9.9 |
| Warm temperate | 1,800–2,600 | 13.4 | 65–85 | 12.5 |
| Dry subtropical | 1,200–1,800 | 12.6 | 85–120 | 17.2 |
| Humid subtropical | 600–1,200 | 9.8 | 120–250 | 19.5 |
| Wet subtropical | 150–600 | 5.3 | 250–550 | 23.6 |

*Source*: [£]PPD (2008), p. 2; [¥]TFDP (2000), p. 47

## 25.5 Birth and Growth of Community Forestry in Bhutan

The birth of the concept of community forestry started with the Royal Decree of 1979 termed as social forestry in which it was said: "people's participation is key to conservation and utilization of forest resources" (Chhetri et al. 2009). In 1969, all forests were nationalized and termed government reserve forests. According to Section 10 of the Bhutan Forest Act 1969, "the Government reserves the rights to the absolute ownership of trees, timber and other forest produce on private land" (Dhital 2002). Before this, no restrictions existed on use of forest resources except poaching of wild animals. This provision was repealed and invalidated by Royal Decree of His Majesty and the Land Act of 1979. In the beginning after the Royal ruling in 1979, there was almost no progress in the field of community forestry, because there was no legal provision for transferring the government reserve forest land to a private community.

Agroforestry is one of the favored land management systems in the mountains (Sharma et al. 2007). The real progress in the development and growth of community forestry started with the beginning of the twenty-first century. Since then growth has picked up momentum. There has been a shift from a primary focus on protection and conservation toward a focus on balancing conservation with sustainable utilization (Peljor 2009). Some of the laws and policies followed by the Government of Bhutan concerning the forests are worth mentioning to understand the need for community forestry (Table 25.2) in Bhutan.

With the adoption of a forest and nature conservation act in 1995, the legal hurdles for the enterprise of community forestry were almost overcome. The first of its kind is Dozam community forest, which was established in 1997 in the Drametse block of Mongar District in Eastern Bhutan. It was the beginning of accepting the traditional rights of the people to access and use forest resources for the fulfillment of their needs.

The rural economy of Bhutan, where most of the people below the poverty line are in rural areas, is not very good. They rely heavily on the forest and forest products for their livelihood. The 10th Five-Year Plan of the government is also emphasizing poverty alleviation in which community forestry has a larger role. The policy is aimed at using a participatory approach to contribute to poverty reduction and

**Table 25.2** Chronology of forest regulations and development of community forestry in Bhutan

| Laws and policies | Decisions | Remarks |
|---|---|---|
| Department of Forestry (DoF) 1952 | Department of Forestry (DoF) created but within Ministry of Agriculture | With Ministry of Trade and Industry |
| Thrimzhung Chenmo 1957 | No restriction on use of forest resources except poaching of wild animals | Open access |
| Forest Act 1969 | All forest resources nationalized as state property | Forest protected with restrictive use only |
| | All forests declared as Government Reserved Forest (GRF), including trees on private land | |
| | Traditional rights and customary laws withdrawn | |
| National Forest Policy 1974 | Prescribed long-term national goal for forests and their utilization | Forest protected |
| | Scientific management of forest | Scientific use permitted |
| Royal Decree 1979 | Social forestry around villages | Way paved for community forestry |
| | Plantation of trees on private as well as communal land | |
| | Managing local resources by local people | |
| Land Act 1979 | Forest resources on private land were allowed to be used by people for their domestic needs but not to be sold to get money | Leniency apparent in accessing resources |
| Forest Policy 1991 | Forest resources to be used on sustainable principles | Emphasis on proper resource management |
| | To ensure conservation of the environment | |
| | Obtain benefits from the forests with rational resources management | |
| | Renewable Natural Resources (RNR) was established | |
| Decentralization of Community Forestry 1993 | Community Forestry at district (Dzongkhag) level activities | Decentralization came into action |
| | Dzongkhag Forestry Extension Section (DFES) created | |
| | Dzongkhag made responsible for implementing activities | |
| Forest and Nature Conservation Act 1995 | Separate chapter on forest management appeared | Scientific participatory forest management by local community |
| | Traditional rights of community restored | |
| | GRF lease accepted for sustainable management by community | |
| First CF established in 1997 | First certified community forest in Mongar district created mainly on degraded land with an area of 300 ha and 109 households | Start of new era in community forestry |
| Land Act 2007 | Lease of GRF further clarified for economic activities | Forest use emphasized |
| Constitution 2008 | Every citizen considered the trustee of natural resources of Bhutan | Citizen's role amplified |

socioeconomic development (Chhetri et al. 2009). The revised rules concerning community forestry are recommended to be liberalized and simplified so that the community forestry program can benefit even more local people.

During the early 1990s, the decentralization policy was adopted in which the people's participation in protection and management of forests was entrusted. To make this system functional, various steps were adopted such as the creation of forestry extension units at the district (Dzongkhag) with trained block forestry extension officers to support the implementation of decentralized forestry activities. The extension officers at district and block levels started facilitating the implementation of community forestry and community forest management groups at the village level. Gilmour (2009) observed that the shift from centralized forest management toward more decentralized local management has resulted in the development, testing, and institutionalizing of a wide range of community-based management approaches throughout Asia and, in more recent years, in Africa and Latin America.

In the initial years there was a problem of conceptualizing and translating it into reality at the ground working stage. Apart from that, even the common people were also not very well informed about this approach, as well as doubtful whether the government would hand over the reserved forest land to them for management and utilization. Both the forest and government staff also were not very sure about the skills of the community in managing the forest resources properly and sustainably (Temphel and Beukeboom 2006). Community forestry is now considered to be the major component of the overall social forestry program in Bhutan (Chhetri 2009). For these reasons the pace of community forestry development in its initial years was slow, especially until 2006. After this, the growth was very fast (Table 25.3).

The district-wise spatial distribution of community forests and the number of households associated with them can be seen from Fig. 25.1. From 2007, the increase in the number of community forests sanctioned has been tremendous.

**Table 25.3** Community forest (CF) growth (to December 2009) in Bhutan

| | CFs handed over to Community Forest Management Group (CFMG) | | Area of CFs handed over | | Households involved in CFMGs | |
|---|---|---|---|---|---|---|
| Year | Numbers | Cumulative | Hectares | Cumulative | Numbers | Cumulative |
| Until 2001 | 3 | 3 | 1,546 | 1,546 | 530 | 530 |
| 2002 | 5 | 8 | 228 | 1,774 | 116 | 646 |
| 2003 | 7 | 15 | 1,052 | 2,826 | 413 | 1,059 |
| 2004 | 9 | 24 | 1,020 | 3,846 | 475 | 1,534 |
| 2005 | 7 | 31 | 1,411 | 5,257 | 709 | 2,243 |
| 2006 | 7 | 38 | 509 | 5,766 | 277 | 2,520 |
| 2007 | 19 | 57 | 2,089 | 7,855 | 845 | 3,365 |
| 2008 | 61 | 118 | 8,334 | 16,189 | 2,965 | 6,330 |
| 2009 | 82 | 200 | 8,808 | 24,997 | 3,433 | 9,763 |

*Source*: Department of Forest and Park Services (2010)

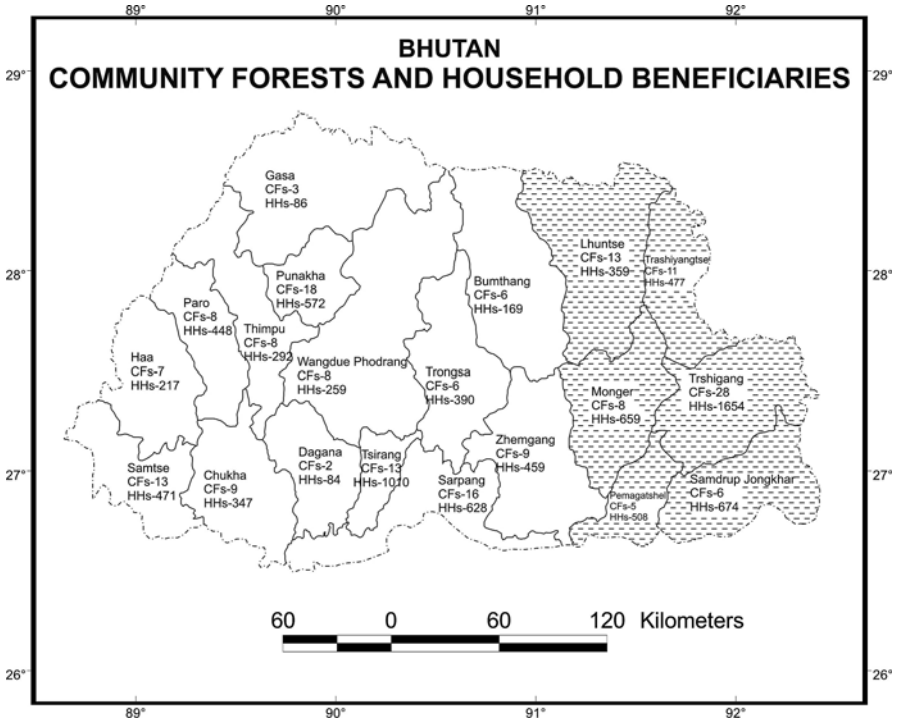


**Fig. 25.1** Community forest and household beneficiary in Bhutan

Community forest has now become an important part of the national forest policy. Before 2007, there were only 38 community forests, but within 3 years (2007–2009) the number rose to 200 (Table 25.3). A total of 9,763 households have been brought under this scheme, which is 7.74 % of the total households in all Bhutan. At present, these community forest management groups have possession of 249.97 km$^2$ of community forest land, comprising 0.9 % of the total forest area in the country. The target is to bring 4 % of the forest area under community forest management by mid-2013.

## 25.6 Selection of Community Forests

In the beginning of the concept of the community forestry development scheme, the priority was on planting trees on barren and degraded land, popularly known as community plantation. The Forest and Nature Conservation Rule, 2000, Chapter IV, Section 36, Clause 1(e) established the requirement of securing "both degraded and good forest with equal ratio" (RGoB 2000) for allotment of community forest. This condition became an obstacle to smooth growth of community forests because getting both degraded as well as good forest land in equal proportion was not easy for

every village. This obstructing clause was withdrawn by Forest and Nature Conservation Rule, 2006 Chapter IV, Section 27, Clause 1 and stressed that the community forests should be "in and around villages and human settlements" (RGoB 2006). This provision has been found to be very practical (Tshering 2009), and it is also reflected through the growth of community forestry in Bhutan (Table 25.3).

Now, community forests are allocated near to villages and village people are the beneficiaries. The households who manage the nearby forest given to them are known as community forest management groups (CFMG). To form a CFMG, a minimum of ten households has to be there as per the rule. Many villages in Bhutan have fewer than ten households. Thus, although they also are interested, they are not eligible to form a CFMG.

On average, the area of a community forest is limited to a maximum of 2.5 ha per household. This area is very small to provide a substantial benefit for a rural poor community. The country's 10th Five-Year Plan focuses on a poverty alleviation scheme through community forestry. Therefore, this smaller allocation of forest land is not going to pave the way for significant reduction of poverty. A smaller size of household villages and a smaller allotment of forested land sometimes do not go hand in hand. In most cases, admissible area and physical limit/boundary do not match. It is always better to define a community forest boundary using natural features such as ridges, valleys, and rivers/streams. When natural boundaries are used, it is generally difficult to fit within low area limits. Hence, there is a need to relax these provisions to improve the effectiveness of community forests (Tshering 2009).

## 25.7 A Brief Profile of Eastern Bhutan in the Country

Eastern Bhutan constitutes a little more than one fourth of the area, population, and households of the country and a slightly greater share of the area under forest (Table 25.4). However, the density of population is slightly lower than the national average, because two northern districts, Lhuentse (5.33 persons/km$^2$) and Trashiyangtse (12.34 persons/km$^2$), are low in population density. The main reasons for lower density in these two districts are steep slopes, high altitude, reduced accessibility, rough terrain, and harsh climatic conditions. Pema Gatshel in the south, with relatively better facilities, moderate altitude, and better agricultural development supporting a larger population, has a very high density (26.76 persons/km$^2$) in comparison with the national average (16.54 persons/km$^2$).

Eastern Bhutan is reasonably high in forest cover in comparison to the rest of Bhutan. The overall 8,860.9 km$^2$ (77.85 %) area of Eastern Bhutan is covered with forest, which includes 7,941.3 km$^2$ of true forest and 919.6 km$^2$ of scrub forest. Pema Gatshel is the only district that has a lower forest cover (53.57 %) than the national average. The highest forest cover is in Monger district (88.47 %). Hence, Eastern Bhutan is blessed with greater forest and forest resources in comparison to the rest of Bhutan.

True forest is dense forest in which the growth of vegetation is very high. Trees are very tall with a good canopy coverage. These forests are superior in commercial

**Table 25.4** Some facts about Eastern Bhutan and the country

| District/region | Area (in km$^2$)[£] | Population[¥] | Density/km$^2$ | Number of households[¥] | Forested area (in km$^2$)[£] | Percent of forest cover |
|---|---|---|---|---|---|---|
| Lhuentse | 2,888 | 15,395 | 5.33 | 3,001 | 2,173.5 | 75.26 |
| Monger | 1,947 | 37,069 | 19.04 | 7,348 | 1,722.6 | 88.47 |
| Pema Gatshel | 518 | 13,864 | 26.76 | 2,937 | 277.5 | 53.57 |
| Samdrup Jongkhar | 2,308 | 39,961 | 17.31 | 8,363 | 1,783.6 | 77.28 |
| Trashigang | 2,283 | 51,134 | 22.40 | 10,813 | 1,802.7 | 78.96 |
| Trashiyangtse | 1,438 | 17,740 | 12.34 | 3,764 | 1,101.0 | 76.56 |
| **Eastern Bhutan (EB)** | **11,382** | **175,163** | **15.39** | **36,226** | **8,860.9** | **77.85** |
| **EB percent** | **29.65** | **27.59** | – | **28.72** | **30.51** | – |
| **All Bhutan** | **38,394** | **634,982** | **16.54** | **126,115** | **27,912** | **72.70** |

*Source*: [£]TFDP (2000); [¥]Census of Bhutan (2005)

production of timber for generating revenue through sale. These forests are also popularly known as woodland forest. In these forests, the growth of vegetation is multilayered, such as grasses, bushes, and smaller trees as well as big trees. These forests are concentrated at lower altitudes where the geographic condition of the vegetative growth is more favorable, such as soil development, rainfall, and temperature. True forest constitutes 89.62 % of the total forest area, or 69.77 % of the entire Eastern Bhutan.

Scrub forest is lower-quality forest cover, found particularly at the higher reaches in the northern part of the region. In this type of forest, the growth of vegetative cover is not very good for two reasons: first, the forest cover is destroyed by human activities and the growth is retarded by this as well as shifting cultivation; second, the climatic conditions are not conducive for vegetative growth. The first reason is more applicable in the lower altitudes where human activities are more prominent, such as Samdrup Jongkhar, Pema Gatshel, and Mongar. The second reason is appropriate for northern districts such as Lhuentse, Trashiyangtse, and Trashigang, where the climate is very harsh and the temperature is very low. Even in these districts, shifting cultivation is practiced, although it is banned today. The vegetative growth is retarded and few large-size trees are found. Most of the land cover is in the form of grasses and bushes with sparse smaller trees. Scrub forest represents 10.38 % of the total forest area or 8.08 % of all Eastern Bhutan.

### *25.7.1 Characteristics of Eastern Bhutan*

Eastern Bhutan is characterized by a wet subtropical climate in the southern parts of Pema Gatshel and Samdrup Jongkhar to the alpine zone of northern Lhuentse and Trashiyangtse. The wet subtropical conditions prevail in the areas lying below

600 m altitude; above this, up to an elevation of 1,200 m the humid subtropical zone is found. At higher elevations, a dry subtropical and a warm temperate zone are present at heights between 1,200 and 1,800 m and from 1,800 to 2,600 m, respectively. Between 2,600 and 3,600 m is a cool temperate zone, and up to 4,600 m, alpine vegetation occurs. Above 3,600 m, all vegetation is reduced because of the severe cold. The characteristics of vegetation continue to change with altitude. In the lower altitudes, the vegetation is very dense with high rates of growth because of the high temperature and high rainfall. Eastern Bhutan receives a high annual rainfall, more than 500 cm per year. Geologically, this area is composed of unconsolidated sedimentary rocks formed with excessive compression during the Himalayan orogeny. In this process, the sedimentary rocks are crushed to such an extent that they cannot withstand the load lying above then. Therefore, landslides are very common, especially at higher elevations during the monsoon season when torrential rainfall lubricates the rocks.

High rainfall is also associated with higher erosion. Rivers have carved out very deep valleys and gorges. The slopes are extremely steep. All the rivers flowing from north run southward to enter Indian Territory. Important among these are the Kuri Chhu and Kulong Chhu Rivers. Kuri Chhu passes through Lhuentse and Mongar Districts; Kulong Chhu traverses through Trashiyangtse, Trashigang, and the eastern edge of Mongar. Both these rivers merge to form the Dangme Chhu, which finally joins the Manas River, and the Manas confluences with Brahmaputra in Assam. The Nyera Ama Chhu passes through Trashigang and Samdrup Jongkhar to meet directly with the Brahmaputra.

### *25.7.2 Status of Community Forestry in Eastern Bhutan*

Community forestry is well developed in Eastern Bhutan in comparison to the other parts of the country. Eastern Bhutan constitutes roughly 29.5 % of the area of the country, but it has 37 % (74 of 200) of the community forests, which consititutes 47 % of the total area (11,864 $km^2$, of 24,997 $km^2$) under community forests. The total number of households benefited in entire Bhutan is 9,763, of which 4,331 households (44 %) are in Eastern Bhutan (Table 25.5).

The benefits from forestry are seen in two ways: first, timber, and second, non-wood forest products. The timber-based community forests in Eastern Bhutan represent 40 % of those of the entire country, and still more of non-wood forest products, more than two thirds (68 %) of the whole country. Taken together, roughly half (47 %) of the entire community forest area lies in Eastern Bhutan. Eastern Bhutan is the most privileged in the development and growth of community forests in Bhutan. The distribution by districts of the area under timber forest and forest for non-wood forest products is shown in Fig. 25.2.

The total area under forest in Eastern Bhutan is 8860.9 $km^2$, equal to 30.51 % of the total for all Bhutan. The community forest area in Eastern Bhutan is 1.34 % of

**Table 25.5** Community forest status (to December 2009) in Eastern Bhutan

| Districts/Region | Number of CFs | Number of households benefited | Community forest types and area in hectares | | |
|---|---|---|---|---|---|
| | | | Forest for timber | Forest for NWFP | Total |
| Lhuentse | 13 | 359 | 654 | 18 | 672 |
| Monger | 8 | 659 | 582 | 1,909 | 2,491 |
| Pema Gatshel | 8 | 508 | 396 | 299 | 695 |
| Samdrup Jongkhar | 6 | 674 | 447 | 1,455 | 1,902 |
| Trashigang | 28 | 1,654 | 4,760 | 317 | 5,077 |
| Trashiyangtse | 11 | 477 | 486 | 541 | 1,027 |
| **Eastern Bhutan** | **74** | **4,331** | **7,325** | **4,539** | **11,864** |
| **EB percent** | **37** | **44** | **40** | **68** | **47** |
| **Entire Bhutan** | **200** | **9,763** | **18,297** | **6,700** | **24,997** |

*Source*: Department of Forest and Park Services (2010)

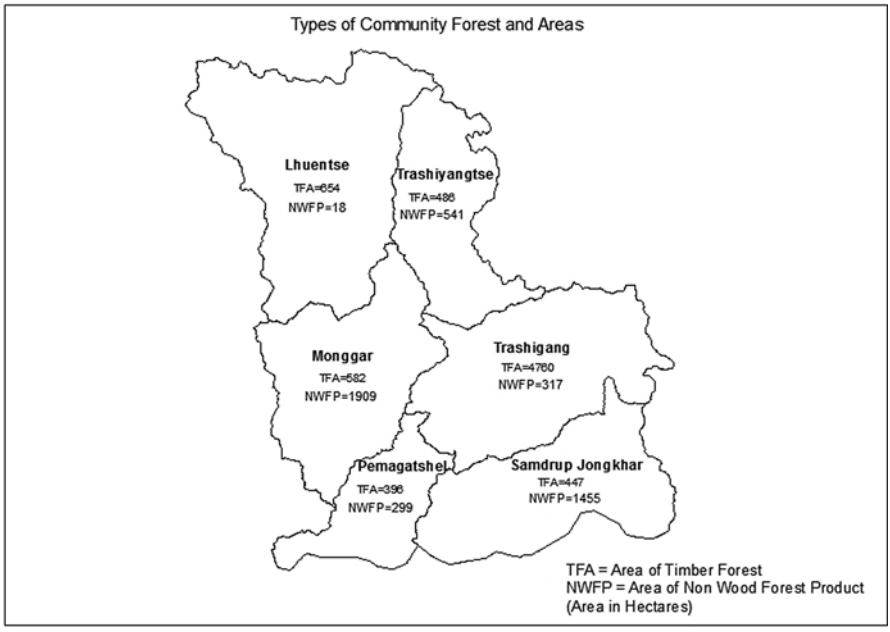


**Fig. 25.2** Types of community forest and areas in Eastern Bhutan

the total forest area in the region, and for all Bhutan this figure is just 0.9 %. The country's 10th Five-Year Plan (2008–2013) emphasizes that 4 % of the area of the forest should be managed by community or private forestry (Department of Forest and Park Services 2010).

### 25.7.3 Dependence of Rural People on Forests in Eastern Bhutan

Rural people are heavily dependent on the forest in Eastern Bhutan. The economy is mainly based on forest and agriculture. Except for a narrow strip of the southern part, all of Eastern Bhutan is mountainous. Whatever development of agriculture is there is confined to the slopes in patches with small fields. Although the main occupation of people is agriculture, it is also not well developed, and cannot be compared with the agricultural practices of the plain areas. Therefore, the rural people use the forest to fulfill their requirements by collecting various items. Most rural people rely on the forest for firewood, used for cooking food as well as keeping their houses warm, particularly in winter. The overall dependence of people on firewood in all Bhutan is 90.7 % and in Pema Gatshel District (Eastern Bhutan) it is 98.2 % (Table 25.6). It is the same case in terms of collection of wild mushrooms, lemon grass, resin, and much more in different districts. People in Eastern Bhutan are more dependent on the forest in comparison to the rest of Bhutan.

More dependence on forest means more and more exploitation of nearby forests. Once community forest is allotted and the members are advised that they have to meet their needs from the defined units only, they will be more economical in use and better managers. Otherwise, they will consume more than their minimum needs such as burning wood to keep the house warm. In one way, this saves fuel/forest products and on the other hand it reduces carbon emission in the atmosphere. The reserved forest will be more protected while the productivity of the community forest will increase. Hence, it is management in two ways with double benefits.

## 25.8 Benefit Accrued to the Community Members and the Nation

Various benefits exist from community forestry, starting from the local grass roots level to the national and projecting to the global level. Community forestry has great potential in forest resources management. The beginning stage of the development

**Table 25.6** Dependence of Eastern Bhutan people on selected forest products

| | Percentage of household involvement | | |
|---|---|---|---|
| Forest products | National average | Highest percentage in district | Name of district in eastern Bhutan |
| Firewood | 90.7 | 98.2 | Pema Gatshel |
| Wild mushroom | 20.7 | 49.3 | Samdrup Jongkhar |
| Lemon grass oil | 0.8 | 5.0 | Lhuentse |
| Dyes | 0.7 | 1.8 | Pema Gatshel |
| Resin | 0.3 | 1.6 | Monger |

*Source*: Turkelboom et al. (2001); derived from Renewable Natural Resources–Census 2001

of community forestry in Bhutan has momentum. The benefit accrued can be seen in different perspectives such as economic gain, employment opportunities, environmental protection, and overall the carbon sink.

### *25.8.1 Economic Gain*

The members of the management group are authorized to use the excess produce of the community forest for their own benefit. The members are expected to meet their needs from the allotted forest area only. They get the timber as well as non-wood forest products, which helps in meeting the requirements of the family and their livelihood. Apart from this, the excess products are sold in the open market, and in this way they acquire money to reinvest for appropriate management of the forest. The gain from community forestry is distributed equally among the members, thus providing the income of the community. Some of the community forest management groups are thinking of developing their forest as a recreational site by proper management so that local people or outsiders will be attracted to visit, but all will have to pay an entry fee. It is a sort of tourism and recreation but at a smaller scale.

### *25.8.2 Employment Opportunity*

Not all the people of the community may need employment, but some poor people who do not have any work may be employed on a daily wage. The forest has many items that can be collected such as wild mushroom, cane shoots, lemon grass, fern tops, fodder, resin, and dyes. These items are known as non-wood forest products. Most of these products are not consumed, but are sold in the market for consumption by others, and some are sold as the raw material for some industries. Therefore, some local people collect the items from the forest and the person who is employed for this collection gets a wage. Somebody also will be employed to maintain the recreational site if it is developed as such. Therefore, the generation of employment is also "on the card" along with proper management of the community forestry. Many of these happenings will depend on the enthusiasm, caliber, and entrepreneurship of the community forest management group.

### *25.8.3 Environmental Protection*

It is already a recognized fact that forests have very important roles in protecting and conserving primary resources such as water, soil, air quality, and biodiversity. Community forests are allocated by officials at the district and division levels on application by a community forest management group. The allotted area includes

both good-quality forest and nearby degraded land. The community forest management group treats the degraded land by planting trees, shrubs, and grasses to protect the soils from further degradation. Trees, shrubs, and grasses are selected on the basis of suitability to the site, location, aspect, and altitude. These activities by community forest management groups enhance the overall environmental condition of an area. The degraded land is brought under forest cover. The needs of the local people are met from the community forest, which they are also maintaining: they are not going into the reserved forest for their requirements. Hence, the reserved forests are not further exploited, and they remain in pristine condition except for use by the forest department in a controlled manner. Therefore, the development of community forestry in Bhutan maintains a very good environmental balance. In this way the forests of the country are protected, a very positive indication. Environmental benefits in community forests are (1) the community rehabilitates degraded areas; (2) water resources are protected in the concerned areas; (3) careful harvest according to management procedures is determined; (4) forest fire reduction is expected; (5) the community keeps a watch on illegal activities by mischievous persons; and (6) the community protects the wildlife in the forested areas.

## 25.9 Contribution Toward Carbon Sink

The concept of a carbon sink became popular after the Kyoto Protocol. Carbon sink is the reduction of atmospheric carbon dioxide gas, done in both natural and artificial ways. An artificial carbon sink (landfills and carbon capture and storage) is very much limited in comparison to the natural sink through utilization by natural vegetation, a natural storage of carbon dioxide for a considerable period of time through the utilization of carbon dioxide gas by photosynthesis. But, removal of forest cover and its burning pump carbon dioxide into the atmosphere. The initiation of community forestry is very much related to the expansion of forest cover, even on degraded land. The increase in forest and its wise management definitely will consume more and more carbon dioxide, leading to a carbon sink. The carbon sink in one territorial limit is not only good for the country but for the whole of the Earth.

The benefits mentioned here are not only in the interests of the people or the local community, but also the government of Bhutan is relieved from carrying out some contingency work. People get employment, they become self-reliant to some extent, their better livelihood is ensured, the financial health of the community is improved, and overall the environment is protected. Ultimately, their surroundings are improved, leading toward achieving the goal of poverty reduction of the 10th Five-Year Plan. This work is also in accord with the Kyoto Protocol for reducing the amount of carbon in the atmosphere. Although the amount of carbon sink through community forestry is very low, it is still of some value, which must be acknowledged.

## 25.10 Benefits from the Forests

Scientific studies reveal that forests offer a number of benefits that ultimately lead to a higher level of economic gain to the communities who manage it as well as to all the living organisms. Forests provide a variety of ecological functions and interactions. Forests enable and facilitate rainwater to percolate down through the soils and finally recharge subsurface water. Thus, they help in providing a regular supply of valuable water for the survival of life. The forests are important in various ways. The primary and most valuable product of the forest is timber, which is used in many ways. Apart from timber, human beings have depended since time unknown on the forests for other products. Some of these products are firewood, soft wood for papermaking, bamboo, cane, rubber plant, herbs, wild nuts and fruits, medicinal plants, aromatic plants, wild edible plants, and fodder for domestic animals.

Numerous small-scale to large-scale industries have been developed today. They were also the source of livelihood in terms of hunting and gathering in olden days, and still are today in some remote areas. There are many more invisible benefits, for example, climate control, pollution check, shelter for wildlife, and various plant species. Still more benefits are water-retaining capacity, flood control, check on soil erosion, recreational site development, aesthetic revival for the people, unending supply of oxygen, carbon sink, and supply of soil nutrients. The loss of forest and forest cover is detrimental to the aforementioned benefits accrued and finally will mean the loss of the forests. It is estimated that a large healthy tree produces enough oxygen each day to support 18 people (Preston et al. 2006). A study of the Puget Sound area (in Washington State, USA) found that the tree canopy cover removed 38,990 tons of air pollutants in 1 year (American Forest 1998).

### *25.10.1 Forest Management*

Forest management is the process by which forests are preserved in such a way that the benefits are accrued continuously without compromising quality, which involves protection, improvement, preservation, and maintenance of forest in a judicious manner. Proper knowledge and understanding of the forest as well as planning, decisions, and implementation are ensured, and this will lead to sustainable forest management.

Forest management has undergone a sea change since the mid-twentieth century. Previously forests were mercilessly exploited and many areas became completely devoid of forest cover. This loss has initiated global warming, exacerbated by the heavy use of fossil fuel in the recent past. Greenhouse gases are on the rise and the loss of forest is also continuing. Therefore, management of the forest and its proper utilization needs, urgently, to be addressed.

The scientific study of forest species and their interaction with the environment is commonly known as forest ecology whereas the management of forests is gener-

**Table 25.7** Steps taken by community and the government to manage forest resources

| Managing rules | Management by community | Government initiative |
|---|---|---|
| Stipulated date for harvesting | Decided by committee or community forest regulator | Decided by agency and accepted by local leaders |
| Monitoring | Community forest regulator | Forest guard |
| Applicable fine, if not obeyed | Fine to be paid to the community | Fine to be paid to government agency |
| Accountability | Accountable to the community | Accountable to agencies |
| Equal rights | Community forest used in equality | Equal rules to all |
| Leadership | Community officials or in charge | Manager of director of agency |

ally referred to simply as forestry. These days the emphasis is on sustainable forest management. The forest department focuses on the integration of ecological, social, and economic values, mostly in consultation with local communities and other stakeholders. The forest should be utilized in such a manner that its quality and quantity are not affected in decades and centuries to come; indeed, it should rather improve. Damage has already occurred, but now there should not be further deterioration.

Human factors are the biggest culprits in the loss of forest cover. They represent the greater demand for forest wood for expansion of agricultural fields, road construction through pristine forest, slash-and-burn (shifting) cultivation, forest fire (human triggered and natural), urban sprawl, and overall human encroachment toward the natural environment and forested areas. Controlled human activities, particularly along the slope and in mountainous regions, is the demand of the time. Indirectly, population control is the foremost initiative to be taken up by society because the sharply growing number of persons means increasing needs for resources. Many resources on the earth are limited, even if they are renewable. Some of the management steps taken by the community and the government are listed in Table 25.7.

## 25.11 Challenge for the Future

Community forestry in Bhutan is very recent. In fact, the increase in allotment by district and division officials has gained momentum in recent years (since 2007). Many of the allotted forests are in the process of growth and development. The benefits from those forests will accrue after some time when they mature and the produce can be used by the people. These products may be timber or non-timber from the forests. Therefore, the success of community forestry will depend on many factors.

### 25.11.1 Support for Community Forestry

Community forestry emerged because of government enactment and support to enable the people to manage the forest allotted to them and have their needs fulfilled, and also receive the benefits from selling forest products with some regulations. Government support must continue so that community forestry develops properly; otherwise, a change in policy may cause harm before reaching maturity. The long-term vision for sustainable management of community forests is to build a strong institutional, political, and social path for a great future (Chhetri 2009). This development will have a significant contribution to rural livelihood, poverty reduction, and improved forest conditions, which ultimately lead to control in climate change.

### 25.11.2 Creating Awareness About Community Forestry

Many rural people are not very much aware of the concept of community forestry and its benefits, which is why awareness of community forestry is needed among the rural masses, so that the people may come forward in large numbers to engage in this work. People must be made aware of the functioning of community forestry, as well as the subsequent benefits. In this way, participation of rural people in this endeavor will be maximized. Thus, awareness programs are needed to be carried by the governmental agencies on a regular basis.

### 25.11.3 Relaxation of Some Rules to Form Community Forestry Management Groups

As per the rules laid down for the formation of community forestry management groups (CFMG), there must be at least ten households to form a CFMG as well as the average maximum area of 2.5 ha per household. These conditions create some problems, as many villages have fewer than ten households, and according to existing rules, they cannot form a CFMG. The average maximum cap of 2.5 ha per household is a very small area. When demarcating the area for the forest, many times the natural boundary does not match, creating a difficulty to be faced. Therefore, there is great need to relax the limitations while considering the CFMG. Relaxation of rules favors the people so they may form a smaller CFMG, as well as to obtain a larger area that will provide a better return from the community forests.

### *25.11.4 Ensure Sustainable Forest Management*

The development and conservation objectives of community forestry can be achieved only by following fundamental principles of sustainable forest management. Hence, the forest should be managed according to scientific knowledge about the ecology and silviculture of the main forest type of the country (Chhetri 2009). In the absence of scientific insight, forest management will not be sustainable and long lasting. The varieties of tree and plant species should be selected on the basis of their adaptability and suitability to the place, location, altitude, and latitude. The utilization of forest resources should be based on their productivity and renewability. It must be ensured that forests are not further degraded, and that areas already degraded are put under forest cover with suitable treatment and management.

## 25.12 Conclusions

Community forestry in Bhutan is very new, but recently its growth has acquired momentum. It has been growing very steadily and has taken the shape of a movement, particularly in Eastern Bhutan. The 10th Five-Year Plan of the nation places more emphasis on poverty reduction, which is mostly associated with a rural population. Rural people are more dependent on forests and in various ways such as the collection of wild food items, fodder, fruits, nuts, herbs, fuel wood, and wood for the construction of houses, grazing, and many more. Community forestry has multiple roles in the life of rural people, starting from meeting the needs of rural people for household demands and extending to income generation. The government has great hope that community forestry will reduce poverty through proper management of allotted forests to CFMGs. It will be achieved through proper implementation and initiation of the community forests in various areas, with slight relaxation of rules to form the CFMGs on local merits and the demarcation of forest areas so that a maximum number of people are brought under the umbrella of the CFMGs. It also important to continue reviewing the benefits accrued to the community as well as to help them in managing the forest resources in scientific manner.

It is equally essential for CFMGs to be in contact with the Department of Forest to acquire the proper methods and training, in addition to their indigenous knowledge, to go ahead in maintaining, preserving, and increasing the productivity of the forest. Forest management is essential not only for the proper livelihood of the people but also for the overall global benefit by maintaining the balance of greenhouse gases. Carbon dioxide is consumed by trees while preparing their food through photosynthesis under sunlight and in this process oxygen is released. Community forestry confines the local people to the restricted zone only, which leads to the protection of other reserved forests managed, looked after, and utilized by the Department of Forest. Hence, trees and forests are climate-modifying agents, and their proper cover and balance will make this planet a livable place for all types of organisms.

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